REMARKS

Claims 1-40 are pending in this application, of which claims 16-40 have been withdrawn from consideration. By this amendment, claim 15 is being amended to further clarify Applicants' invention.

The specification has been amended to correct the informalities pointed out by the Examiner.

At the outset, Applicants thank the Examiner for the courtesies extended during the March 4, 2004 interview.

Specification

The Examiner has objected to the specification because of the informalities. The specification is being amended to correct these informalities as follows:

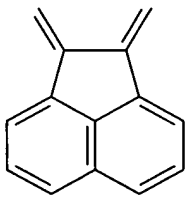
(i) The term "an acenaphtenquinone group", at page 13, third line from the bottom, has been amended to "a 1,8-naphthylene group."

(ii) The symbol "An" throughout the specification has been deleted and a new symbol "Nph" is used instead, namely every two "An" are replaced by one "Nph".

For example,

[(2,6-iPr_2Ph)-N=C(An)-C(An)=N-(2,6-iPr_2Ph)]$NiBr_2$ is replaced by

[(2,6-iPr_2Ph)-NNphN-(2,6-iPr_2Ph)]$NiBr_2$, wherein Nph has formula (Nph):



(Nph)

Claim Rejections

Rejection Under 35 U.S.C. § 112, second paragraph

A. Response to the Rejection of Claims 1-9 and 10-15 under 35 U.S.C. § 112, second paragraph as being indefinite.

The Examiner has rejected Claims 1-9 and 10-15 under 35 U.S.C. § 112, second paragraph as being indefinite as follows:

1. The base of the percentage of the prepolymer porosity in Claim 1 is not defined.

The specification states "The porosity, expressed as percentage of voids, and the distribution of pore radius are determined by the mercury method described later." (page 7, lines 29-31). In the method section of the specification, a detailed procedure for the determination of the porosity is described after the sentence, "the porosity expressed as percentage of voids is determined by absorption of mercury under pressure." (page 28, lines 11-30). The percentage porosity is further given by the relation $X=(100*V)/V_1$, wherein the base of the percentage (V_1) is volume of the sample (page 28, lines 26-31). Therefore, Applicants submit that the porosity of the polymer has been properly defined in the specification.

2. The description of "the two substituents R2 form together an acenaphtenquinone group" is inaccurate.

Claim 15 has been amended to substitute "an acenaphtenquinone group" with "a naphthylene group" to correct the error. The amended claims are now believed to be in compliance with 35 U.S.C. § 112, second paragraph. Reconsideration and withdrawal of the rejection respectfully is requested.

Rejection Under 35 U.S.C. § 103

A. Response to the Rejection of Claims 1-9 and 10-15 under 35 U.S.C. § 103(a) as being unpatentable over Vaughan et al. in view of Sacchetti et al.

In response to the rejection of claims 1-9 and 10-15 under 35 U.S.C. § 103(a) as being unpatentable over International Application No. WO 97/48736 by Vaughan et al. ("Vaughan") in view of US Patent No. 5,759,940 by Sacchetti et al ("Sacchetti"), Applicants respectfully submit that a *prima facie* case of obviousness has not been made out by the Examiner and respectfully traverse the rejection.

In order to establish a *prima facie* case of obviousness, the Examiner must establish all three of the following essential criteria: (1) there must be a motivation in the cited prior art to modify the reference as suggested by the Examiner; (2) the cited

references must teach or suggest each of the claimed elements; and (3) the cited references must provide a basis for a reasonable expectation for success. The motivation to modify and the reasonable expectation for success must come from the cited prior art and not the Applicants' specification. Further, it is not enough that a reference can be modified absent a suggestion in the cited prior art to undertake such modification.

The present invention relates to a multi-stage process for the polymerization of olefins comprising:

- a first polymerization stage using a Ziegler-Natta Ti or V catalyst to prepare an olefinic polymer endowed with a particular porosity value, and
- a second polymerization stage, carried out in the presence of the thus obtained porous polymer on which a late transition metal catalyst is supported.

In contrast, Vaughan refer to the use of late transition metal catalysts as catalyst components supported on silica. It is silent about the drawbacks, such as lower catalytic activity and decrease of the branching tendency, involved by the supportation of these catalyst components. Therefore, Vaughan do not furnish any incentive to overcome the above drawbacks by supporting these catalyst components on a porous olefinic polymer, as claimed in the present Application.

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Sacchetti disclose the preparation of catalyst components for the polymerization of olefins, said components being obtained by a first polymerization stage using a Ziegler-Natta Ti or V catalyst to prepare an olefinic prepolymer, and a second stage in which the thus obtained prepolymer is contacted with a metallocene catalyst component.

Since Sacchetti do not carry out the polymerization in the presence of late transition metal catalysts in either the first or the second preparation stages as defined in the present Application, there is no teaching or suggestion to use a catalytic system based on "late transition metal complexes" and to overcome the drawbacks involved by using inorganic supports.

It is well known that catalyst components may be used either unsupported in a homogeneous polymerization or, alternatively, supported on inorganic carriers, such as SiO_2 or Al_2O_3. Nevertheless, as clearly disclosed in the Application at page 4, lines 8-13, "the supportation on silica and alumina of late transition metal catalyst leads to lower catalytic activities in comparison with homogeneous polymerization reactions. Moreover,

the supportation causes a substantial decrease of the branch-producing tendencies (branches/1000 carbon atoms) of these catalysts, thus leading to polymers having greater melting points and lower processability".

Therefore, the technical problem to be solved by the instant invention (see page 4, lines 14-17) is to obviate the above drawbacks by providing a process for the olefin polymerization in which the particular technique of supportation of these catalyst components achieves an unexpected increase of the catalytic activity as compared to that obtained in homogeneous polymerizations and in heterogeneous systems when silica or alumina support is used. Since the cited references do not address the technical problem of lower catalytic activity and decrease of the branching tendency associated with the supportation of late transition metal catalysts on silica or alumina, they do not provide any motivation or suggestion to combine the teachings to resolve such technical problem.

Additionally, Sacchetti emphasize that "the reaction of the prepolymer containing the solid component of the prepolymerization catalyst with the transition metal compound is preferably carried out in an inert hydrocarbon medium in which the metallocene compound is soluble (toluene, benzene and similar hydrocarbons)" (column 6, lines 18-23), whereas the polymerization in the present invention does not require or prefer to be carried out in an inert hydrocarbon. Sacchetti also specify that "the prepolymer is produced in a quantity greater than about 0.5 g per g of component and up to about 2000 g/g. Preferably the amount is between 5 and 500 g per g of solid component, and more preferably between 10 and 100 g per gram of solid component." In contrast, the present invention can use a polymer support with a much higher quantity produced in the first stage of the polymerization (claim 1, step (I)) than that claimed in Sacchetti. For example, Example 1 of the present invention shows that the quantity of polymer produced is 24,286 g per gram of solid component. (page 29, lines 21-28). Therefore, there is no motivation or suggestion to combine Sacchetti with Vaughan to use the polymer support for the late transition metal catalyst system as presently claimed. Neither is there any reasonable expectation of success shown in the reference to make such a modification.

Therefore, since none of the essential criteria for a *prima facie* case of obviousness have been established, Applicants respectfully request that the Examiner

reconsider and withdraw the § 103(a) rejection of claims 1-9, and 10-15, and allow those claims.

Further, even if a *prima facie* case of obviousness could have been shown based on the cited references, Applicants have overcome any such *prima facie* case of obviousness by showing the unexpected results of the increased catalyst activity and the unchanged branching index.

At the interview with the Examiner held on March 4, 2004, the Examiner questioned whether example 1 and comparative example 2 of the present invention are comparable, so as to demonstrate unexpected results, on the basis that the example 1 was conducted in gas phase and the comparative example 2 was conducted in liquid phase. The Examiner reasoned in the Office Action that Example 1 and Comparative Example 2 are not performed under the same polymerization conditions since "the pressure of ethylene used in Example 1 (2,960 KPa) is almost three times higher than the ethylene pressure of Comparative Example 2 (1,100 KPa)." As shown in the attached Rule 1.132 Declaration, the two experiments are comparable since the monomer concentration and the reaction temperature were the same. In addition, the diluents used are linear hydrocarbons and they are nonpolar and do not form hydrogen bonding. Therefore, the polymerization reaction kinectics are the same for both experiments.

The pressure difference between the polymerization of Example 1 and Comparative Example 2 is because ethylene polymerization in Example 1 is carried out in gas phase, while in the comparative Example 2 the ethylene polymerization is carried out in a liquid-phase. Notwithstanding, the monomer concentration in the reaction medium and the reaction temperature are exactly the same, being 1.17 mol/L and 55 °C, respectively. (page 30, line 15 and page 31, line 20-25). According to polymerization kinetics, the total quantity of polymer produced is a function of monomer concentration and reaction temperature whereas the reaction pressure has no impact on the quantity of polymer produced. (The Rebirth of Polypropylene: Supported Catalysts, Hanser Publishers, Munich, Page 41, herein attached).

The polymerization in Example 1 is carried out by using propane as a reaction diluent. Both ethylene and propane are in a gaseous state at the reaction temperature of 55°C. The total pressure in the reactor is given by the sum of the partial pressures (p.p.) of

each gas (Dalton's law). When the total pressure is 2,960 kPa an ethylene concentration of 1.17 mol/L is obtained in the mixture of ethylene and propane.

The polymerization in Comparative Example 2 is carried out by using hexane as a reaction diluent. Thus, ethylene monomer is dissolved in liquid hexane at 55°C. Therefore, an ethylene concentration of 1.17 mol/L is achieved when the total pressure is maintained at a value of 1,100 kPa which is considerably lower than the total pressure maintained in Example 1.

In view of the above clarification, Applicants submit that the polymerization of Example 1 and Comparative Example 2 is conducted under the substantially the same conditions for the purpose of demonstrating unexpected results.

In a heterogeneous catalyst system, as compared with a homogeneous catalyst system, a skilled artisan would have expected a decrease in the catalyst activity and the branching index of the polymer so prepared, such as in the case of silica supports showed in Comparative Example 2, in which the catalyst activity and the branching index decreased from 41.4 KgPE/gNi and 27.7 CH_3/1000 C for an unsupported catalyst system (page 31, lines 4-5) to 33.4 KgPE/gNi and 17.8 CH_3/1000 C, respectively (page 31, lines 29-30).

The present invention shows an unexpected result which is successfully achieved using a multistage process by supporting the late transition metal complexes on an olefinic polymer endowed with a suitable porosity. As clearly demonstrated by the comparative examples 1-2 and by the examples of the invention, this type of support improves the polymerization activity, and at the same time, preserves the branching-tendency of these catalysts. The graphs of Fig. 1 also show that, under the same polymerization conditions, late transition metal catalysts are much more active when used in the multi-stage process according to the present invention than unsupported or silica supported catalysts, according to prior art processes.

The higher polymerization activities and unchanged branching index (72.8 KgPE/gNi and 30.2 CH_3/1000 C, page 30, lines 20-21) achieved in the present invention provide yet further reason for withdrawal of the obviousness rejection.

Reconsideration and withdrawal of the Rejection respectfully is requested.

Applicants respectfully request that a timely Notice of Allowance be issued in this case. Should the Examiner have questions or comments regarding this application or this

amendment, Applicants' attorney would welcome the opportunity to discuss the case with the Examiner.

The Commissioner is hereby authorized to charge U.S. PTO Deposit Account 08-2336 in the amount of any fee required for consideration of this amendment.

Respectfully submitted,

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I hereby certify that this correspondence is being deposited with sufficient postage thereon with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Alexandria, VA 22313-1450 on May 4, 2004

May 4, 2004
Date of Signature